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The Impact of Bank Consolidation on Commercial Borrower Welfare

Abstract

We estimate the impact of bank merger announcements on borrowers' stock prices for publicly-traded Norwegian firms. In addition, we analyze how bank mergers influence borrower relationship termination behavior and relate the propensity to terminate to borrower abnormal returns. We obtain four main results. First, on average borrowers lose about one percent in equity value when their bank is announced as a merger target. Small borrowers of target banks are especially hurt in large bank mergers, where they lose an average of about three percent. Second, bank mergers lead to higher relationship exit rates for three years after a bank merger, and small bank mergers lead to larger increases in exit rates than large mergers. Third, target borrower abnormal returns are positively related to pre-merger exit rates, indicating that firms that find it easier to switch banks are less harmed when their bank merges. Fourth, we find weak evidence that target borrowers with large merger-induced increases in exit rates are more negatively affected by bank merger announcements, suggesting that target borrowers are forced out of relationships and suffer welfare losses as a result of bank mergers.

JEL code: G21, C41

Keywords: bank relationships, bank mergers, market power.

1. Introduction

How do mergers affect the welfare of customers? Understanding the implications of industry consolidation activity on customer welfare has been one of the defining issues in the merger literature over the past two decades. The impact of mergers in the banking industry is particularly important. Bank debt is a pervasive form of corporate financing across virtually every industry. Thus, shocks created by bank mergers have the potential to impact entire economies. Moreover, spurred by two decades of deregulation, banks around the world continue to consolidate through merger and acquisition activity. Although these developments are dramatically altering the global financial services landscape, little empirical evidence exists that directly measures how bank mergers influence the welfare of bank borrowers. In this paper, we help fill this void by estimating the impact of bank mergers on small but publicly-traded commercial bank customers in Norway.

Academics typically stress market power and efficiency as the two most important sources of gains to banks that merge. However, it is unclear whether these gains come at the expense of bank customers. Increases in market power could lead to higher prices, lower quality, and fewer financial products, but bank mergers that improve the efficiency of the banking sector could weed out poorly-operated banks, force down prices, and produce a more complete menu of financial products.[1]

We analyze the share price responses of commercial loan customers to bank merger announcements. Borrowers are separated according to whether they are affiliated with the acquiring, target, or rival banks, and average abnormal returns are computed for each group of borrowing firms. Theory of banking and relationships suggests that not all firms will be similarly affected by the loss or alteration of a banking

[1] For some firms, market power and efficiency improvements may have a counter-intuitive influence. Petersen and Rajan (1995) argue that banks require some form of market power to invest in the type of relationship lending important to small, informationally-opaque borrowers. They show that these borrowers can actually benefit from increases in market power. Moreover, efficiency enhancements could harm customers that previously benefited from underpriced loans made by inefficient banks.

relationship. Consequently, we examine the variation in abnormal returns across borrower and merger characteristics, including a measure of how easily borrowers can switch bank relationships. Using a time-series of bank relationship data and hazard function estimators, we calculate the propensity for a borrower to terminate a bank relationship. If bank mergers result in increases in bank market power, then a firm with a high propensity to switch bank relationships may be less susceptible to merger-induced reductions in borrower welfare.

Our analysis produces four main results. First, corporate borrowers of target banks experience an average abnormal return of –0.99 percent upon the merger announcement, while borrowers of acquiring and rival banks experience no significant decline. Small target borrowers perform worse on average than large target borrowers, particularly when the merger involves two large banks. Second, bank mergers cause relationship exit rates to increase, but most of this increase is due to the influence of small bank mergers. Third, a target borrower with a high propensity for switching bank relationships experiences a higher abnormal return than one with a low propensity to switch. This suggests that lower switching costs and the availability of substitute forms of financing shield some target borrowers from the adverse impact of bank mergers. Fourth, we find weak (marginally significant) evidence that merger-induced increases in target borrower exit rates are associated with lower abnormal returns. This may suggest that some target borrowers are pushed out of relationships after a bank merger and suffer welfare losses accordingly.

Previous studies of the impact of mergers on industry competitiveness have analyzed three different proxies for customer welfare. The first is the stock price reaction of rival firms to merger announcements within an industry. This measure assumes that positive (negative) stock price reactions by rivals indicate a post-

merger decline (increase) in the competitiveness of the industry.[2] Emphasizing the impact on rivals of a merger is problematic because the relationship between rivals and their customers is not necessarily a zero-sum game. For example, Jayaratne and Strahan (1997) and Calomiris and Karceski (2000) argue that large efficiency gains within the banking industry partially accrue to customers so that zero or positive abnormal returns to rival banks need not imply that customers are worse off. The second proxy is the change in product prices after a merger.[3] Using a data set of small Italian firms, Sapienza (1999) finds that loan rates fall after small in-market bank mergers but rise after large bank mergers. Although changes in product prices provide clearer signals about customer welfare, price is not the only product attribute that consumers care about. Service, quality, selection, and availability are additional product dimensions that influence customer satisfaction. The third proxy is the frequency that customers switch products. Post-merger increases in product switching may indicate reduced customer satisfaction or that merged firms effectively drive out customers. For example, Sapienza (1999) finds that exit rates for small borrowers of target banks increase after a bank merger and that post-merger termination is unrelated to borrower profitability. Her interpretation is that management of newly-merged banks effectively kick out some small borrowers. On the other hand, higher post-merger relationship termination rates need not imply that customers are adversely affected. For example, the U.S. Department of Justice *Merger Guidelines* interprets a high switching rate by customers as a signal of a competitive market or the presence of close product substitutes.

By utilizing borrowing firm abnormal returns and exit rates, we attempt to address the shortcomings of each of these three proxies. If markets are efficient, then abnormal returns provide direct signals about whether

[2] Eckbo (1983, 1985), Stillman (1983), and Eckbo and Wier (1985) generally conclude that rivals do not benefit from mergers and interpret this as evidence that mergers do not facilitate monopoly rents. James and Wier (1987) document a similar result for the banking industry.

[3] Kim and Singal (1993) and Chevalier (1995) show that mergers in the airline and supermarket industries lead to price increases and argue that increased market power dominates efficiency gains in these two sectors. Moreover, Prager and Hannan (1998) show that deposit rates fall as a result of U.S. bank mergers that occasion substantial increases in local market concentration.

bank mergers help or hurt shareholders of borrowing firms. These abnormal returns also capture the net welfare impact of the bank merger, including the influence of all expected changes in price, quality, service, and availability on the borrower. Moreover, by relating borrower stock price responses to merger-induced changes in switching behavior, we can establish whether increased exit rates enhance or reduce borrower value.

To conduct our analysis, we collect data on Norwegian bank mergers from 1983 to 1996. Data from Norway offer several distinct advantages. First, we can easily observe the identities of a set of firm-bank relationships through time. In the U.S. and many other countries, such information is either confidential or difficult to obtain. Second, because the relationship information is for exchange-listed firms, we can measure stock price changes around bank merger announcements. Studies using relationship data from privately-held firms cannot estimate abnormal returns. Third, commercial debt in Norway comes almost exclusively from banks, and the majority of borrowers in our sample maintain only one bank relationship at any given time. In addition, U.S. banking bears a closer resemblance to Norwegian banking than it does to the *keiretsu*-based lending relationships in Japan or the house-bank relationships in Germany.[4] Thus, Norway offers a setting where bank relationships should be important to firms in ways that are directly comparable to the U.S.

The rest of the paper proceeds as follows. Section 2 describes the data sources and provides some background about bank merger activity in Norway. Section 3 examines the stock price impact of bank merger announcements on borrowers of merging and rival banks. Section 4 models the termination behavior of borrowing firms and relates the propensity to terminate to borrower abnormal returns. Section 5 concludes.

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[4] Banks in Germany and Japan can exert substantial control over firm decision-making through equity interests and proxy voting rights. For descriptions of how the welfare of banks and borrowers are related in these countries, see Hoshi, Kashyap, and Scharfstein (1991), Kang and Stulz (2000), and Gorton and Schmid (1999). Norwegian banking regulation prohibits a bank from taking an equity position in a non-financial firm greater than 1% of the bank's asset value.

2. Background and Data

The evolution of Norwegian banking over the last two decades has evolved along a path similar to U.S. banking. Between 1983 and 1987, Norwegian regulatory authorities lifted interest rate and loan quantity controls, relaxed branching restrictions, allowed for more flexible forms of bank capital, and opened Norway to competition from foreign and newly-created domestic banks.[5] Deregulation resulted in intensified competition among Norway's banks and led to expansionary lending policies. In an effort to grow, banks began to merge. Bank mergers continued through the late 1980s and early 1990s, fueled in part by rescue efforts during a four-year financial crisis that began in 1988.[6] By 1993, the crisis had subsided, but new regulations under the European Union (EU) and European Economic Area (EEA) enabled banks to expand freely across borders. Such liberalization measures continued to pressure Norwegian banks to increase their scale through consolidation.

Our data set includes a set of bank merger announcements, a historical record of bank relationships for firms listed on the Oslo Stock Exchange (OSE), and financial and stock price information on OSE-listed banks and firms. We collect all merger announcements made from 1983 to 1996 by banks with commercial customers in Norway. Our sources for the announcements are two Norwegian newspapers, *Aftenposten* and *Dagens Næringsliv*, and various periodicals archived on the *Dow Jones Interactive* system. We match the announcements with annual information on firm-bank relationships. Firms listed on the OSE are required each year to report their "primary" bank relationships in the publication . We use the time

[5] In 1984, regulatory officials allowed foreign banks to establish wholly-owned subsidiary banks in Norway. Seven international banks responded (*1994 Annual Report* for the Banking, Insurance, and Securities Commission of Norway). Authorities also approved the creation of a new domestic commercial bank for the first time since 1961. Between 1984 and 1986, a total of four new domestic commercial banks were created in Norway (1*995 Annual Report* for the Banking, Insurance, and Securities Commission of Norway).

[6] See Ongena, Smith, and Michalsen (1999) for a detailed description of the Norwegian banking crisis.

series of these relationships compiled by Ongena and Smith (2000). *Kierulf's Handbook* and OSE databases provide all accounting and stock price information on sample firms and banks.

Table 1 provides an annual overview of the total number of banks and OSE-listed firms, bank consolidation activity, the number of relationship terminations, and bank industry concentration in our sample. The Appendix lists the identity of the merging banks, the announcement dates, the number of borrowers associated with the acquirer and target, and other merger attributes. Each year we track an average of 21 banks and 115 OSE firms that have relationships with at least one bank (each firm maintains a relationship with an average of 1.33 banks). The banks include all Norwegian commercial banks, large Norwegian savings banks, international banks operating in Norway, and international banks operating outside of Norway that have reported relationships with our sample firms. Our borrowing firms represent 95 percent of all non-bank OSE-listed firms and account for an even larger fraction of total market capitalization. We collect information on 39 bank merger announcements, 23 of which were eventually completed. Across the 39 mergers, we obtain 520 acquirer borrower observations, 78 target borrower observations, and 3,571 rival borrower observations. On average, 4.5 percent of existing bank relationships are terminated annually, but roughly double that amount are added as new relationships each year. By U.S. standards, bank relationships in Norway are concentrated, but not so relative to other Nordic countries.[7] To formally measure industry concentration, we calculate a Herfindahl-Hirschman Index (HHI) based on the proportion of total relationships maintained by each sample bank. During our sample period, the level of HHI ranges from 1,961 to 3,262. The U.S. Department of Justice *Merger Guidelines* considers any HHI above 1,800 as signifying a highly concentrated market.

[7] On average, 75 percent of sample firms maintain a relationship with at least one of Norway's two largest commercial banks, Christiana Bank og Kreditkasse or Den norske Bank. Measured in 1997 assets, the four-firm bank concentration ratio in Norway is 45 percent, compared with 85 percent in Sweden, 71 percent in Finland, and 90 percent in Denmark (*Kredittilsynets tilraadning til Finansdepartementet,* 3/18/99).

Summary statistics for acquiring and target banks and their OSE-listed borrowing firms are presented in Table 2. The median-sized acquiring bank (40.9 billion Kroner or about $5.8 billion in total assets) is more than five times as large as the median-sized target bank (7.5 billion Kroner or about $1 billion). For acquiring (target) banks, 14 (41) percent have assets between $100 million and $1 billion, 50 (55) percent have assets between $1 billion and $10 billion, and 36 (4) percent have assets greater than $10 billion (not reported in Table 2). Compared to borrowers of target banks, the borrowers of acquiring banks are larger (median annual sales of 683 million Kroner versus 361 million Kroner), more profitable (median operating income to book value of assets of 5.29 versus 3.11), older (median age of 64 years versus 46 years), and more likely to maintain multiple bank relationships (the fraction with multiple bank relationships is 0.52 versus 0.36). The firms in our sample are small compared to U.S. stocks traded on the NYSE but much larger than the Italian firms studied by Sapienza (1999).[8] Since many Norwegian firms maintain only one bank relationship at a time, it is reasonable to expect that losing a Norwegian bank relationship due to a bank merger is a material event for a borrowing firm.[9] In contrast, the average firm in Sapienza's (1999) Italian data set maintains nine bank relationships, making it less likely that the loss of any single Italian bank relationship would have any significant adverse impact on the firm.

3. The Wealth Impact of Bank Merger Announcements

In this section, we examine the stock price response of borrowers to announcements that their banks are merging, sorting these firms by borrower size, merger size, and bank affiliation (acquirer, target, or rival).

[8] Based on 1996 NYSE market capitalization breakpoints, 59 percent of our borrowing firms are in the smallest size decile, 33 percent are in the next four size deciles, and 8 percent are larger than the median-sized NYSE firm. Median sales for Sapienza's (1999) Italian borrowers are about $8 million compared with median sales of $58 million for borrowing firms in our Norwegian data set.

[9] On average, 74 percent of our sample firms maintain a relationship with only one bank, 17 percent maintain a relationship with two banks, 7 percent maintain three bank relationships, and only 2 percent maintain four or more bank relationships.

Patterns in bank abnormal returns resulting from mergers are well documented in the literature.[10] Studies have found that bank abnormal returns vary according to whether the bank is the acquirer, target, or a rival, as well as by the bank's size and strategic focus. There is good reason to believe that borrower abnormal returns will also vary by these characteristics. For instance, efficiency considerations may dictate that merged banks take on the strategic focus of acquired banks (see Peek and Rosengren (1998) and Walraven (1997)). Therefore, a merger can harm some target borrowers by simply altering the lending policies of the target bank. Moreover, Peek and Rosengren (1996), Berger, Scalise, Saunders, and Udell (1998), and Strahan and Weston (1998) show that bank financing often tends to be characterized by a "size effect in lending," where small banks cater to small borrowers and large banks cater to large borrowers. These studies show that large mergers are followed by increases in lending to large firms, while small mergers are associated with increased lending to small firms. Where a size effect in lending exists, small borrowers face the possibility of being "squeezed out" by mergers that substantially increase bank size.

3.1 Estimating individual security and portfolio abnormal returns

We estimate daily abnormal returns using market model regressions. To reduce problems associated with contemporaneously correlated errors, we form equally-weighted portfolios of firms sharing a common event date.[11] We regress the daily returns on event portfolio j, r_{jt}, on a measure of the market return, r_{mt}, and a set of daily event dummies, δ_{jkt}, that take the value of one when day t is inside the event window and zero otherwise,

[10] For example, see James and Wier (1987), Cornett and De (1991), Houston and Ryngaert (1994), Becher (1999), DeLong (1999), Kane (1999), and Houston, James, and Ryngaert (2000). Berger, Demsetz, and Strahan (1999) provide a recent overview of the literature on the gains to banks in mergers and Cybo-Ottone and Murgia (2000) present recent event study evidence using European data.

[11] Another motivation for forming event portfolios is that the distribution of the number of borrowers associated with each merger event is uneven. For example, in the merger between Bergen Bank and Den norske Creditbank announced on October 5th 1989, there are 23 OSE-listed firms associated with the target. In contrast, we have 15 bank merger events where the target bank has only one OSE-listed borrower. Consequently, if we equally weight each target borrower observation, the Bergen Bank/Den norske Creditbank merger would receive more weight than fifteen other mergers combined.

$$r_{jt} = \alpha_j + \sum_{i=-3}^{3} \beta_{ij} r_{mt+i} + \sum_{k=-7}^{7} \gamma_{jk} \delta_{jkt} + \varepsilon_{jt}, \quad t = -157, -169, \ldots, 107. \qquad (1)$$

Dates inside the event window are indexed by k. Our event window contains 15 trading days (three weeks). The coefficients γ_{jk} measure daily abnormal returns during the event period. The market model is estimated over a 265-day period starting 157 days before the event and ending 107 days after the event. We consider three proxies for the market return—a value-weighted index of all OSE stocks, an equally-weighted OSE index, and a world market index.[12] Results are similar using each of these benchmarks, so we report statistics for only the value-weighted OSE index. Because non-traded stocks are fairly common on the OSE, we include three lead and three lagged market returns to correct for non-synchronous trading (see Scholes and Williams (1977)).

Cumulative abnormal returns (CARs) are computed as sums of daily abnormal return estimates $\hat{\gamma}_{jk}$. We report CARs for three different event windows, the announcement day by itself [AR(0)], an eight-day period up to and including the announcement day [CAR(-7,0)], and the seven-day period after the announcement day [CAR(+1,+7)].[13] In discussing our results, we emphasize the abnormal returns leading up to and including the announcement day, i.e. AR (0) and CAR(-7,0), but also report the post-announcement CARs for completeness. We use a seemingly unrelated regression (SUR) framework for reporting average abnormal returns across events.[14]

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[12] The world market index is a value-weighted portfolio of *Datastream* total return indices for the U.S., Japan, U.K., and Germany.

[13] To date, bank merger event studies have focused on the share responses of banks, but the literature has not come to a consensus agreement on which event window best captures the real economic effect. For example, James and Wier (1987) use AR(-1), AR(0), CAR(-1,0), CAR(-4,0), CAR(-15,0), and CAR(-15,+15); Cornett and De (1991) consider each day from –15 to +15; Houston and Ryngaert (1994) use an event window that starts four days prior to the first announcement of an intention to merger and ends on the merger agreement date; Becher (1999) uses CAR(-30,+5); and Kane (1999) uses AR(0).

[14] See Thompson (1985). We form portfolios for a particular category (such as the 21 events that involve target borrowers) by stacking the event regressions from equation (1) into an N x 1 matrix, where N is the number of events included in the portfolio. Each portfolio CAR estimate is a weighted average of the individual event abnormal returns with weights proportional to the inverse of the variance of the event residuals. Although not reported, calculating average CARs by equally-weighting event abnormal returns yields similar results.

3.2 Average share price reaction of banks

Before analyzing cross-sectional abnormal returns to borrowers, it is helpful to first consider the abnormal returns for banks around bank merger announcements. Table 3 presents average CARs for banks separated into target, acquirer, and rival groupings. From the 39 bank merger announcements, we are able to estimate CARs for 26 acquiring banks and 19 target banks. The other acquiring and target banks were not publicly traded at the time of the merger announcement. The abnormal returns for rival banks are based on 39 equally-weighted portfolios of all OSE-traded banks not involved in the announced merger. The abnormal return patterns in Table 3 are similar to those documented in the extant literature. The CAR for target banks is a positive and statistically significant 4.68 percent on the announcement day and 8.48 percent over the eight days up through and including the announcement date. Acquiring and rival banks both have average CARs very close to zero.

Under each of the three groupings, we also separate average bank CARs by the size of the acquiring and target banks: Large-Large, Large-Small, and Small-Small. "Large" banks are the largest five by total Norwegian assets, measured in the year prior to the merger event. All other banks are considered "Small." The four Large-Large mergers in our sample result in an average increase in HHI of 508. For highly concentrated industries, the U.S. Department of Justice considers any merger resulting in an increase of HHI larger than 100 as "likely to create or enhance market power or facilitate its exercise" (see Section 1.51(c), U.S. Department of Justice *Merger Guidelines* (1992)). In our sample, Large-Small mergers result in changes to HHI from 1 to 100, while Small-Small bank mergers typically result in changes to HHI between 0 and 1.

There appears to be substantial cross-sectional variation in target bank CARs when grouped by merger size. Up through the announcement day, the average target bank CAR for Large-Small mergers is

substantially higher than the average CARs for the other two merger sizes. For example, the average target bank CAR(-7,0) for Large-Small mergers is 12.98 percent, compared with –2.76 percent for Large-Large mergers and –0.30 percent for Small-Small mergers. Unfortunately, we have valid target bank return data for only one Large-Large merger, so the abnormal return estimate for this segment of banks is imprecise. In addition, this merger was announced simultaneously with an earnings warning from bank management and a credit warning from Standard & Poor's.[15]

3.3 Average share price reaction of borrowers

As illustrated in the Appendix, many of the bank mergers in our sample involve only a few, if any, publicly-traded target borrowers because the target banks are often small. Moreover, although acquiring borrower observations are spread evenly throughout the data set, target borrowers are not. Out of the 78 target borrower observations, 54 are associated with four Large-Large merger events. The small sample of targets outside of the Large-Large mergers limits the statistical power of some of the tests. However, our sample compares favorably to other studies of borrower stock price reactions to news concerning bank's durability. For example, in their study of borrowers' reactions to bank announcements of distress, Slovin, Sushka, and Polonchek (1993) establish their main result that corporate borrowers are bank stakeholders whose welfare is tied to their affiliated bank's durability using a sample of one bank and 29 borrowers.

Table 4 reports the average event portfolio CARs for borrowing firms that maintain relationships with merging and rival banks. "Small" ("Large") borrowers are those ranked below (at or above) median sales in

[15] On October 5th 1989, Bergen Bank announced an agreement to acquire Den norske Creditbank to form the largest bank in Norway. On the same day, Den norske Creditbank released an interim earnings announcement detailing increases to estimated losses on loans and guarantees (see "Den norske Creditbank reports interim results," *PR Newswire*, 10/05/89*)*. Moreover, S&P CreditWatch put both banks on their surveillance list as "negative," warning that "the merger comes at a time when each bank is seeking to recover from a period of financial difficulties with credit losses at very high levels by international standards" (see "S&P puts Bergen Bank Corp. on , 10/06/89). Investors were also apparently disappointed that government regulators thwarted plans for Bergen Bank to merge with the healthier Christiania Bank og Kreditkasse instead of Den norske Creditbank (see "Two big banks in Norway agree to negotiate merger," *Wall Street Journal*, 10/06/89).

the year prior to the bank merger announcement. Announcement-day CARs indicate that on average, borrowers of acquiring and rival banks experience little share price reaction, while target borrowers experience a statistically significant decline in value of 0.99 percent. The average effect on target borrowers is mainly driven by the reaction of small target borrowers in Large-Large mergers. These borrowers experience an abnormal return of –2.90 percent on the day the merger is announced. Small target borrowers fare better in Small-Small mergers, averaging 5.50 percent over the (-7,0) event window, and appear not to be harmed by Large-Small mergers. Merger size influences large target borrowers in a much different way than small target borrowers. Large target borrowers are unaffected by Large-Large bank mergers, but experience an average CAR(-7,0) of –5.53 percent for Small-Small mergers, though we have only two observations for that category. The abnormal returns to acquiring bank borrowers remain close to zero across all firm and bank size categories, and rival bank borrower abnormal returns are economically and statistically negligible.

The target borrower results provide some insight into the importance of the size effect in lending. The abnormal return patterns are consistent with Berger *et al.* (1998) who find that lending to small customers increases after mergers between small banks and falls after large bank mergers. Strahan and Weston (1998) also show that lending to small customers rises after small bank mergers, but find no decrease in lending after large mergers. Peek and Rosengren (1996) and Berger and Udell (1996) find that acquisitions by large banks lead to a reduction in lending to smaller corporate customers. However, our results do not indicate that small firms borrowing from small banks suffer when a larger rival acquires their bank. Instead, small target borrowers are hurt in Large-Large mergers but appear to benefit from Small-Small bank mergers.

To summarize the empirical results thus far, borrowing firms of acquiring and rival banks experience average abnormal returns close to zero, but target borrower equity value falls by an average of one percent

when banks announce their intent to merge. This reduction in borrower welfare occurs as target banks experience significantly positive announcement returns. Moreover, target borrower abnormal returns vary according to borrower size and merger size. Small borrowers of target banks experience an average price decline of 1.67 percent across all mergers, but when the merger involves two large banks, the average abnormal return decline is 2.90 percent.

4. Borrower Welfare and the Propensity to Switch

Merger-induced changes in strategy, personnel, or location could impair valuable lending relationships that have been cultivated over time, but the damage done to a borrowing firm from relationship disruption ultimately depends on how easy (costly) it is for the firm to switch banking relationships. If bank mergers are damaging to firms, borrowers with low switching costs should experience higher merger-induced abnormal returns than borrowers with high switching costs. Fama (1985), Sharpe (1990), and Rajan (1992) argue that switching costs are lower for firms with alternative sources of financing or that can easily communicate their value to a new lender.

So far, we have sorted borrower abnormal returns by bank affiliation, borrower size and merger size--variables found to be relevant in the bank merger literature. In this section, we investigate the influence of switching behavior on borrower welfare. We estimate the termination behavior of borrowers using a hazard function that depends on the duration of a bank relationship and other firm- and relationship-specific characteristics. From this hazard model, we calculate a borrower's "termination propensity," which serves as a proxy for borrower switching costs. Abnormal returns are regressed on firm characteristics, merger characteristics, and termination propensity to analyze the influence of switching costs on borrower welfare.

Our analysis is complicated by the fact that a bank merger itself can have a direct effect on relationship termination rates. Bank mergers may serve as a natural time to re-evaluate lending relationships, and the welfare consequences of merger-induced changes in termination behavior are unclear. For instance, as Sapienza (1999) argues, higher post-merger exit rates by borrowers could indicate that new bank management forces some borrowers out and that these borrowers are injured accordingly. Conversely, if the services at the merged bank decline or become more costly, exit rates could increase as firms with low switching costs leave for a more favorable alternative. In the former case, those forced to leave the bank are worse off than those remained. In the latter case, borrowers that leave the bank are better off than those that stay. To address this issue empirically, we examine how a merger's influence on termination rates is related to borrower abnormal returns.

4.1 Estimating switching behavior

We model borrower termination behavior using proportional hazard models.[16] We use hazard functions to estimate the probability that a firm will switch banks, conditional on the incumbent relationship surviving through some date t. Greenbaum, Kanatas, and Venezia (1989), Sharpe (1990), and Rajan (1992) argue that switching costs will be related to the amount of time a firm has spent in a bank relationship. The proportional hazard function conveniently summarizes the connection between relationship duration and the likelihood of terminating the relationship, and allows for other explanatory variables to independently influence the switching decision. Our specification assumes that the time spent in a bank relationship can be described by a Weibull distribution. The Weibull is common to hazard rate specifications because it allows for switching likelihood to depend monotonically on duration through a single parameter, α. When $\alpha > 1$ (< 1), the distribution is said to

[16] Kalbfleisch and Prentice (1980) and Lancaster (1990) thoroughly discuss hazard rate estimation.

exhibit positive (negative) duration dependence, implying that the conditional likelihood of terminating a relationship increases (decreases) in relationship duration.

We measure the duration of a bank relationship as the number of consecutive years a firm lists a bank in *Kierulf's Handbook* between 1979 and 1995, and a switch to occur when the firm drops or replaces the bank on the list. In the absence of censored observations, the proportional hazard model is easily estimable using maximum likelihood methods. However, two types of censoring are present in our data, one due to the start and end points of our sample period, and the other due to listing and delisting of firms on the OSE. Bank relationships that begin before 1979 or before a firm is listed on the OSE introduce left censoring. Bank relationships that continue after 1995 or after a firm delists introduce right censoring. Without adjusting for censoring, maximum likelihood estimation of proportional hazard models produces biased and inconsistent estimates of model parameters. To account for right censoring, we estimate the log-likelihood function as a weighted average of the sample density of duration spells and the survivor function for uncompleted spells.[17]

4.2 Estimates of termination behavior

Table 5 reports four hazard rate regressions. The specifications trade off parsimony with completeness and emphasize the impact of bank mergers on the termination rate. We first include three borrower-specific control variables studied by Ongena and Smith (2000) that should be related to borrower switching costs. Each variable is measured at the end of the year prior to termination. *Ln Sales* measures the size of the firm in terms of the natural logarithm of sales, adjusted to 1996 Norwegian Kroner. Because large firms are often followed by multiple analysts, covered by newspapers, and listed on foreign stock exchanges, these borrowers are less

[17] Directly controlling for left censoring is less straightforward. In economic duration analysis, it is common to ignore left censoring (see Kiefer (1988)). However, Heckman and Singer (1984) argue that biases induced by left censoring can be as severe as biases stemming from right censoring. Ongena and Smith (2000) analyze the sensitivity of estimates of bank relationship duration to left censoring. They show that the coefficient estimates of the hazard rate specification remain robust to left censoring.

likely to have problems credibly communicating their value to potential new investors than small firms. *Profitability* is the ratio of firm earnings before interest and taxes to the book value of assets, included as a proxy for the level of internal cash flows. Firms with higher internal cash flows should be less dependent on any one bank's financing, making switching easier. *Multiple Relationships* is a dummy variable that equals one if a firm maintains more than one simultaneous bank relationship and zero otherwise. Firms with multiple bank relationships have more than one potential source of inside bank financing and therefore face lower switching costs.

Next, we include variables relevant to bank merger activity and the level of market concentration. *Annual DHHI*, measured as the change in HHI (divided by 100) in the year prior to termination, captures the impact of changes in market concentration on all firms, including those not involved in a merger. *Merger* is a dummy variable indicating whether or not a bank merger has occurred during a borrower's relationship with its bank. We use two definitions for *Merger* that make different assumptions about how long bank mergers have an effect on exit rates. *Merger* < ¥ (used in Models (1) and (2) in Table 5) takes the value of one when a bank merger occurs at any point during the relationship, allowing mergers to influence any future decisions made about terminating a relationship. *Merger £ 3* (used in Models (3) and (4)) takes the value of one when a merger occurs in the three-year period prior to termination, so bank mergers only affects exit rates in the subsequent three years. Both researchers and practitioners have argued that three years is a reasonable gestation period for restructuring to occur following a bank merger (see Berger *et al.* (1998), pp. 196-197).

We include two interaction variables that allow the impact of *Merger* to vary by size of the borrower and merger. *Large Firm* is a dummy variable that equals one when a firm's market capitalization is greater than or equal to the median-sized firm, measured by sales in the year prior to termination. *DHHI* is the specific

change in market concentration created by the merger, divided by 100. When *DHHI *Merger* and *Merger* are both included in the specification, the coefficient on *Merger* estimates the impact of small mergers on the hazard rate (since Small-Small mergers have *DHHI* very close to zero). Similarly, when we interact *Large Firm* with *Merger* and *DHHI *Merger*, the coefficient on the stand-alone variable *Merger* reflects the impact of the merger on small borrowers in small mergers.

Holding duration constant, the likelihood of ending a bank relationship decreases in firm size and is higher for multiple-bank firms. The estimate of α is greater than one, implying that the likelihood of switching banks increases in the duration of the relationship. Similar to Ongena and Smith (2000), these results suggest that the propensity to terminate is higher for small firms, firms with multiple bank relationships, and firms in relatively long-lived relationships. *Annual DHHI* enters all regressions with a positive and statistically significant coefficient, implying that increases in market concentration induce all sample firms to switch more often. However, *Annual DHHI* is not significant when we explicitly incorporate time variation into the exogenous variables.[18]

In Models (1) and (2), *Merger* < ¥ has a positive but statistically insignificant impact on the estimated hazard rate, indicating that over the entire span of a bank relationship small bank mergers have little effect on exit rates. However, large mergers significantly reduce switching rates. For example, using Model (2), a borrower who is never involved in a bank merger but is otherwise average has a 5.10 percent chance of terminating a relationship in any given year. Following a large bank merger, this termination likelihood declines to 2.94 percent. When we limit the impact of the merger to three years (Models (3) and (4)), we find that small mergers significantly increase the likelihood that a firm will leave its bank. But as the size of the bank merger increases, firms become less likely to leave. For instance, using Model (4), an average firm not

involved in a merger faces a switching probability of 4.67 percent per year. This likelihood increases to 15.66 percent after a small merger, but increases to only 5.26 percent after a large merger. Interactions with the *Large Firm* variable produce no statistically significant effects. Taken together, the hazard models suggest that borrowers involved in smaller bank mergers switch more often than those in large bank mergers.

4.3 Borrower welfare and switching behavior

Table 6 reports regressions that investigate the cross-sectional variation in individual borrower abnormal returns. The cross-sectional regressions include explanatory variables that measure a firm's dependence on its incumbent bank's financing and the size of the merger in terms of its impact on bank market concentration. The specifications also split forecasted hazard rates into a pre-merger component that includes the influence of firm, relationship, and market-wide variables on termination behavior, and a component that incorporates merger-induced changes to the hazard rate. For each regression, the dependent variable is the borrower CAR generated from the market model in equation (1) on a firm-by-firm basis. For targets, we report results using three different measures of the dependent variable, CAR(-7,0), AR(0), and CAR(+1,+7). For acquirer and rival borrowers, we report only the CAR(-7,0) results.

The regressions include up to seven explanatory variables, grouped into three categories. The first category contains three firm-specific control variables, *ln Sales*, *Profitability*, and *Multiple Relationships*, motivated in Section 4.2 as proxies for a firm's dependence on financing from its bank. The second category contains two merger-specific control variables, including *DHHI* to capture merger size and *DHHI*Large Firm* to measure the differential impact of merger size on small versus large firms. The third category contains two variables based on Model (4) of Table 5 to generate firm-level forecasts of the hazard rate. *Termination*

[18]The estimates we report could be biased if the paths of the explanatory variables are correlated with bank relationship duration. To correct for potential biases, we re-estimated all hazard rate models using a methodology that allows for time variation in the explanatory variables (see Petersen (1986)). With the exception of *Annual DHHI*, all other estimates remain robust.

Propensity captures the estimated pre-merger switching rate and proxies for how easily a borrower can switch bank relationships. It is calculated by setting each variable (*ln Sales*, *Profitability*, *Multiple Relationships*, *Annual DHHI*) and relationship duration equal to the specific borrower's values in the year prior to the announcement and *Merger* equal to zero. *DTermination Propensity* captures the merger-induced change in switching rates and is estimated as the difference between *Termination Propensity* and the forecasted post-merger hazard rate that sets *Merger* equal to one and includes the relevant values for *DHHI* and *Large Firm*. Because the firm-specific and merger-specific control variables also appear in the forecast models for *Termination Propensity* and *DTermination Propensity*, their inclusion is meant to measure any additional impact that merger size has on borrower welfare that is unrelated to the propensity to terminate.

For the (-7,0) event window, Models (1), (2), (7), and (8) of Table 6 suggest that when target borrowers and acquiring borrowers have multiple bank relationships, their abnormal returns are higher. These models also show that small acquiring borrowers and more profitable target borrowers experience higher abnormal returns as well. With the inclusion of *DHHI* and *DHHI*Large Firm*, the negative sign on *ln Sales* highlights the result from Table 4 that small firms perform better than large firms in Small-Small bank mergers. However, none of the firm-specific control variables are significant for announcement-day returns (Models (3) and (4)).

In contrast, the effect of merger-specific variables on target borrower abnormal returns is more robust across model specifications. Consistent with Table 4, target borrower abnormal returns are negatively related to the merger-induced change in market concentration. Furthermore, small target borrowers are harmed more than large target borrowers in large bank mergers. The coefficient of –1.62 on *DHHI* in Model (2) means that a change in *DHHI* of 5 (i.e., moving from a typical Small-Small to Large-Large merger) reduces the abnormal

return on small firms by 8.10 percent, while the estimate of 0.71 on *DHHI*Large Firm* means that the abnormal return on large firms falls by only 4.55 percent.

Although not reported, we estimate cross-sectional models that include the abnormal return of each borrower's affiliated bank as well as the abnormal return of the entire Norwegian banking industry as explanatory variables. We do this to see if there is a link between the welfare of the borrowing firm and its incumbent bank when a bank merger is announced. On average, target banks experience positive abnormal returns and target borrowers experience negative abnormal returns upon the announcement of a bank merger, so we would like to see if target borrowers lose the most when target banks gain the most. The coefficient estimates on both bank CAR variables are statistically insignificant for CAR(-7,0) and AR(0) for both target and acquiring borrowers, so these cross-sectional tests do not permit us to conclude that target banks gain at the expense of their borrowers.

Table 6 indicates that borrower switching behavior can influence abnormal returns. For target borrowers, *Termination Propensity* enters with a positive coefficient that is statistically significant for both CAR(-7,0) and AR(0), implying that firms with lower switching costs earn higher abnormal returns than firms with higher switching costs. The coefficient estimate of 1.56 in Model (2) means that moving from a target borrower with a termination propensity at the 25th percentile (1.32 percent, see Table 2) to one with a forecasted hazard rate at the 75th percentile (3.81 percent) increases the estimated CAR (-7,0) by 3.88 percent. The coefficient on *DTermination Propensity* for the target borrower regressions is –0.25 and marginally significant (p-value equals 13 percent) in Model (4). Moving from a target firm at the 25th percentile value of *DTermination Propensity* (-1.28 percent) to the 75th percentile (10.26 percent) translates to a decrease in abnormal returns of 2.89 percent. Thus, although less statistically convincing, the estimates on

DTermination Propensity suggest that, at the margin, merger-related increases in the propensity to terminate a relationship work to decrease borrower abnormal returns. This result supports the idea that the more a bank merger causes a borrower's termination propensity to increase, the more the borrower is harmed. The signs of the coefficients on *Termination Propensity* and *DTermination Propensity* carry over to acquiring borrowers, though the magnitudes of these estimates are smaller and statistically insignificant.[19]

To summarize, we find that firms become more likely to terminate a relationship in the three-year period after a merger, particularly when the merger involves two small banks. Target borrowers with higher pre-merger propensities to terminate bank relationships are more insulated from the negative welfare consequences of bank mergers. Finally, the target borrower loses more equity value when the bank merger causes a large increase in its exit rate.

5. Conclusion

We directly estimate the impact of bank mergers on customer welfare by analyzing the share price reactions of corporate borrowers in Norway to the announcement that their banks are merging. We also analyze the influence of bank mergers on the switching behavior of borrowers and relate the borrower's propensity to terminate a bank relationship to its announcement-day abnormal return. The Norwegian firms in our study are small by U.S. standards (about 60 percent of them would be in the smallest size decile based on 1996 NYSE market capitalization breakpoints) but are large compared to the privately-held firms examined by Sapienza (1999). Our firms operate in an environment where bank credit is the predominant form of commercial debt

[19] To verify the robustness of the cross-sectional regressions reported in Table 6, we change the model specifications in a number of ways, including (1) removing *ln Sales*, *Profitability*, and *Multiple Relationships*, (2) adding the CAR of the borrower's affiliated bank and the CAR of the rival bank portfolio (to proxy for bank industry effects), and (3) using other hazard models such as Models (1)-(3) in Table 5, their time-varying counterparts as described in footnote 18, and hazard models that explicitly distinguish between acquiring and target borrowers.

finance, and most firms receive credit from only one bank. In many other respects, the institutional setting in Norway is similar to the U.S.

We find four main empirical results. First, the average abnormal stock price response of borrowers of acquiring and rival banks is close to zero at the announcement of a bank merger, but target borrowers experience an average stock price decline of one percent. Moreover, abnormal returns are lowest (-2.90 percent) for small borrowers of the target when two large banks merge. Since target banks experience positive abnormal returns (4.68 percent) on the merger announcement day, it raises the suspicion that target banks are somehow taking advantage of their borrowers during mergers. However, when the target bank CAR is included in the cross-sectional regressions of target borrower abnormal returns, the coefficient is not statistically different from zero, implying that target banks are not gaining at the explicit expense of their borrowers. The fact that small borrowers of target banks are harmed in Large-Large bank mergers but fare well in Small-Small bank mergers is consistent with the idea that borrowers are injured by a change in strategic focus of the newly-merged bank (see Berger, *et al.* (1998), Peek and Rosengren (1996), and Strahan and Weston (1998)). Patterns in borrower abnormal returns are not consistent with a standard market power story of merger gains to banks. In particular, borrowers of acquiring and rival banks do not appear to suffer upon the announcement of a large bank merger.

Second, borrowing firms tend to terminate bank relationships more often in the three-year period after a bank merger, especially when the merger is small. When bank mergers occur, both banks and borrowers may consider these events as opportune times to re-evaluate and perhaps terminate their existing relationships.

Third, target borrowers that switch banks often are less negatively affected by bank merger

announcements, indicating that relationship disruption caused by bank mergers has less of an adverse effect on firms that switch banks often. We interpret a borrower's pre-merger hazard rate as a proxy for the firm's switching costs. Thus, target borrowers with lower switching costs are not harmed as much when a bank merger is announced.

Fourth, we find weak (marginally statistically significant) evidence that target borrowers whose exit rates increase substantially due to a bank merger have lower abnormal returns. This provides a measure of support for Sapienza's (1999) claim that borrowers of target banks are more likely to be "severed" after their bank merges, harming these borrowing firms in the process.

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Table 1

Annual overview of sample consolidation activity and relationship turnover, 1983-1996.

The total number of sample banks includes all banks with connections to firms listed on the Oslo Stock Exchange (OSE). Proposed bank mergers include all announced intentions by sample banks to merge, while completed bank mergers are those that are successfully completed. Sources for these data include newspaper articles from *Dagens Næringsliv*, *Aftenposten*, and those compiled through *Dow Jones Interactive*, annual reports of the Banking, Insurance, and Securities Commission (BISC) of Norway, and *Kierulf's Handbook*. Firms reporting bank relationships includes all OSE firms that report at least one bank relationship in *Kierulf's Handbook*. The Herfindahl-Hirschman Index (HHI) is based on the number of relationships each bank maintains with sample firms at the end of the year.

Year	Total number of sample banks	Proposed bank mergers	Completed bank mergers	Firms reporting bank relationships	Total number of relationships	Number of new relationships	Number of relationships terminated	Industry concentration as measured by HHI
1983	24	1	1	115	166	5	5	2,049
1984	27	1	1	140	189	7	5	2,003
1985	26	0	0	138	183	6	1	1,990
1986	26	2	2	133	177	17	16	1,961
1987	23	2	2	125	168	14	10	2,034
1988	19	1	1	113	156	18	12	2,266
1989	18	4	2	111	143	11	6	3,258
1990	17	7	5	100	134	14	7	3,230
1991	17	1	1	106	141	14	9	2,905
1992	17	4	3	101	133	16	5	3,262
1993	18	3	1	106	138	10	4	3,134
1994	20	1	0	113	150	14	5	2,984
1995	19	4	2	98	130	10	6	2,939
1996		8	1					
Ave.	20.8	2.8	1.6	115.3	154.5	12.0	7.0	2,616.5

Table 2

Summary statistics on sample merging banks and borrowing firms maintaining relationships with merging banks.

This table reports summary statistics for merging banks and customers listed on the Oslo Stock Exchange (OSE). All statistics are from the year ending prior to the merger and are collected from *Kierulf's Handbook*, OSE databases, or company annual reports. Complete financial information is available for 26 acquiring banks, 21 target banks, 495 customers of acquiring banks, and 69 customers of target banks. Asset values, sales, and market values are stated in millions of 1995 Norwegian Kroner. One US dollar is roughly equivalent to 7 Norwegian Kroner. *Profitability* is the ratio of operating income to book value of assets, stated in percentage terms. Age is the time elapsed between the firm's founding date and the year of measurement. *Multiple Bank Relationships* equals one when a firm maintains more than one bank relationship and zero otherwise. *Leverage* is the book value of debt divided by the sum of market value of equity and book value of debt, stated in percentage terms. *Market-to-book* is the ratio of market value of equity plus book value of debt divided by the book value of assets. *Termination Propensity* is the average forecasted likelihood that a firm leaves a relationship conditional on survival through the year prior to the merger, assuming that the firm is not involved in a merger. *DTermination Propensity* is the forecasted addition to *Termination Propensity* assuming that the firm is involved in a bank merger. The forecasts are generated using the estimates from Model (4) of Table 5.

	Acquirers				Targets			
	Mean	Median	25th Percentile	75th Percentile	Mean	Median	25th Percentile	75th Percentile
Banks								
Market Value of Equity	2,395	1,304	1,269	2,203	523	323	183	476
Book Value of Assets	69,094	40,911	29,079	116,891	17,121	7,547	6,488	20,806
Borrowing Firms								
Market Value of Equity	1,028	310	73	1,187	768	163	68	457
Sales	2,450	683	163	3,211	2,509	361	48	1,031
Profitability (%)	5.09	5.29	0.00	10.08	0.25	3.11	-0.07	6.69
Age in years	61	64	21	89	60	46	17	85
Multiple Bank Relationships	0.52	1.00	0.00	1.00	0.36	0.00	0.00	1.00
Leverage (%)	60.3	63.8	46.6	78.9	53.3	57.8	37.3	80.4
Market-to-book	1.33	1.19	1.01	1.47	1.33	1.23	0.97	1.61
Termination Propensity (%)	3.54	2.39	1.29	4.69	2.75	2.40	1.32	3.81
ΔTermination Propensity (%)	15.02	9.60	0.00	20.81	5.01	0.00	-1.28	10.26

Table 3

Cumulative abnormal returns for banks listed on the OSE.

Percentage cumulative abnormal returns (CARs) OSE-listed banks are calculated for trading days around the announcement of a proposed merger using the value-weighted index of all Oslo Stock Exchange (OSE) stocks as the benchmark market portfolio. Coefficient and standard error estimates are based on a seemingly unrelated regression specification that restricts the CARs to be equal across events in a given category. We include 3 lags and leads of the market index to control for non-synchronous trading. "Large" banks are the top five of the banks ranked according to total Norwegian banking assets in the year before the event. All other banks are considered "Small." Significance levels for CARs are based on χ^2-tests.

Category	# of Events	AR (0)	CAR (-7,0)	CAR (+1,+7)
Acquiring banks	**26**	**0.31**	**-0.06**	**-0.03**
Large - Large Bank	2	-0.29	2.20	-5.31*
Large - Small Bank	16	-0.07	0.18	-0.22
Small - Small Bank	8	0.61	-0.64	-0.59
Target banks	**19**	**4.68*** **	**8.48*** **	**-1.52**
Large - Large Bank	1	0.17	-2.76	-21.33***
Large - Small Bank	14	6.21***	12.98***	0.21
Small - Small Bank	4	1.64	-0.30	3.82
Averages of rival banks	**39**	**0.04**	**0.22**	**-0.18**
Large - Large Bank	4	0.06	0.61	-1.23*
Large - Small Bank	18	0.12*	0.39*	0.18
Small - Small Bank	17	-0.00	0.13	-0.39*

*** Significant at 1%. ** Significant at 5%. * Significant at 10%.

Table 4

Cumulative abnormal returns for borrowing firms.

Percentage cumulative abnormal returns (CARs) are calculated for trading days around announcements of proposed bank mergers using the value-weighted index of all OSE stocks as the benchmark market portfolio. Coefficient and standard error estimates are based on a seemingly unrelated regression specification (SUR) that restricts CARs to be equal across N event portfolios. An event portfolio is an equally-weighted portfolio of borrowing firms sharing a common merger announcement. We include three lags and leads of the market index to control for non-synchronous trading. "Large" banks are the top five banks ranked according to total Norwegian banking assets in the year before the event. All other banks are "Small." Large (Small) firms are in the top (bottom) 50% of the firms ranked according to sales in the year before the event. Due to missing sales figures, not all sample firms can be placed into a size category. Significance levels for CARs are based on χ^2-tests.

Category Average	# of Event Portfolios	# of Firms	AR (0)	CAR (-7,0)	CAR (+1,+7)
Borrowers of acquiring banks	**31**	**520**	**0.28**	**0.13**	**0.84**
Large firms	28	298	0.19	0.10	0.01
Large - Large Bank	4	76	0.15	0.90	-0.39
Large - Small Bank	17	212	0.08	-0.47	0.32
Small - Small Bank	7	10	0.71	0.80	-2.51
Small firms	28	211	0.15	0.41	1.31
Large - Large Bank	4	43	-1.44	-1.28	-1.21
Large - Small Bank	17	150	-0.00	-0.19	1.99
Small - Small Bank	7	18	1.72	3.53	3.27
Borrowers of target banks	**21**	**78**	**-0.99***	**0.05**	**2.03**
Large firms	10	32	-0.27	-1.23	3.78**
Large - Large Bank	4	26	0.06	-0.00	3.17
Large - Small Bank	4	4	-0.97	-2.31	2.13
Small - Small Bank	2	2	-2.06	-5.53	8.67**
Small firms	16	41	-1.67**	0.51	0.40
Large - Large Bank	4	28	-2.90***	-3.39	0.21
Large - Small Bank	3	3	0.34	-0.04	-0.39
Small - Small Bank	9	10	-0.30	5.50	0.67
Borrowers of rival banks	**39**	**3,571**	**0.03**	**-0.36**	**-0.26**
Large firms	39	1,685	-0.01	-0.40	0.05
Large - Large Bank	4	100	0.39	-0.09	1.78
Large - Small Bank	18	714	-0.21*	-0.21	0.42
Small - Small Bank	17	871	0.14	-0.67**	-0.40
Small firms	39	1,744	0.08	-0.27	-0.63*
Large - Large Bank	4	128	0.62	-0.79	-0.90

Large - Small Bank	18	766	-0.07	-0.26	-0.44
Small - Small Bank	17	850	0.17	-0.30	-0.85*

*** Significant at 1%. ** Significant at 5%. * Significant at 10%.

Table 5

Weibull specifications of bank relationship termination rate by borrowing firms.

Models estimate the likelihood of bank relationship termination conditional on relationship duration and a set of firm and merger variables using a proportional hazard Weibull model. All estimates are adjusted for right censoring. *ln Sales* is the log of end-of-year sales, deflated by the Norwegian CPI. *Profitability* is the ratio of earnings before interest and taxes to the book value of assets. *Multiple Relationships* takes the value of one when a firm maintains multiple bank relationships, and zero when a firm maintains a relationship with a single bank. *Annual DHHI* measures the annual change in concentration in the market for bank relationships in terms of the Herfindahl-Hirschman Index (divided by 100). *Merger*$<\infty$ takes the value of one if the bank of the borrowing firm merges at some point during the relationship, and is zero for relationships not involved in a bank merger. *Merger*≤ 3 takes the value of one if a bank merger occurs in one of the three years prior to relationship termination, and is zero otherwise. *DHHI* measures the change in the concentration in the market for bank relationships resulting from a given completed merger in terms of the Herfindahl-Hirschman Index (divided by 100). *Large Firm* takes the value of one when the firm belongs to the top 50% of firms, ranked annually by sales, and zero otherwise. The parameter α measures duration dependence. An estimate of $\alpha > 1$ ($\alpha < 1$) implies positive (negative) duration dependence. Standard errors are reported in parentheses. The number of observations is 383.

Dependent	Merger $<\infty$		Merger ≤ 3	
Variable	(1)	(2)	(3)	(4)
Intercept	-2.788 ***	-3.008 ***	-2.948 ***	-2.958 ***
	(0.371)	(0.426)	(0.172)	(0.197)
ln Sales	-0.073 ***	-0.037	-0.067 ***	-0.066 **
	(0.027)	(0.037)	(0.023)	(0.026)
Profitability	0.278	0.441	0.400	0.422
	(0.644)	(0.487)	(0.577)	(0.585)
Multiple Relationships	0.304 *	0.337 **	0.401 ***	0.403 ***
	(0.162)	(0.165)	(0.145)	(0.147)
Annual ΔHHI	0.068 *	0.064 *	0.065 ***	0.067 ***
	(0.022)	(0.037)	(0.022)	(0.022)
Merger	0.487	0.591	1.209 ***	1.200 ***
	(0.364)	(0.392)	(0.130)	(0.155)
ΔHHI * Merger	-0.223 ***	-0.207 ***	-0.214 ***	-0.172 **
	(0.042)	(0.060)	(0.047)	(0.069)
Merger * Large Firm		-0.343		0.023
		(0.212)		(0.197)
ΔHHI * Merger * Large Firm		0.026		-0.092
		(0.085)		(0.104)
$\hat{\alpha}$	1.427 †	1.427 †	1.545 †	1.546 †
	(0.135)	(0.135)	(0.162)	(0.162)
Median Duration	15.59	15.75	12.99	13.03
	(1.76)	(1.79)	(1.14)	(1.14)
LogL(θ)	-242.958	-241.474	-232.180	-231.852

† α=1 can be rejected at 1%. *** Significant at 1%. ** Significant at 5%. * Significant at 10%.

Table 6

Cross sectional estimation of cumulative abnormal returns: borrowing firms of target, acquiring and rival banks.

The dependent variable is the Cumulative Abnormal Return (in percent) for individual borrowing firms based on regressions using the value-weighted index of all Oslo Stock Exchange (OSE) stocks as the benchmark market portfolio. *ln Sales* is the log of end-of-year sales, deflated by the Norwegian CPI. *Profitability* is the ratio of earnings before interest and taxes to the book value of assets. *Multiple Relationships* takes the value of one when a firm maintains multiple bank relationships, and zero when a firm maintains a relationship with a single bank. *DHHI* measures the proposed change in the bank relationship concentration in terms of the change in the Herfindahl-Hirschman Index (divided by 100). *Large Firm* takes the value of one when the firm belongs to the top 50% of firms, ranked by sales, in the year before the event, and zero otherwise. *Termination Propensity* is the forecasted hazard rate in the year prior to the merger announcement calculated using the estimates from Model (4) in Table 5, the values of the variables from the year prior to the merger, and with *Merger* set to zero. *DTermination Propensity* measures the change in the hazard rate by setting *Merger* equal to one and incorporating the merger-specific information from Model (4) of Table 5. There are 69 target, 495 acquiring, and 3,223 rival borrower observations. Standard errors are reported in parentheses.

Borrower Affiliation	Target						Acquirng		Rival	
Dependent Variable	CAR(-7,0)		AR(0)		CAR(+1,+7)		CAR(-7,0)		CAR(-7,0)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Intercept	2.99	2.24	-1.48	0.13	-2.58	-4.07	1.59	2.93	0.34	0.51
	(2.80)	(3.15)	(1.83)	(1.73)	(2.64)	(3.31)	(1.55)	(1.98)	(0.61)	(0.74)
ln Sales	-0.49	-0.31	0.02	0.04	0.54*	0.59**	-0.43*	-0.51**	-0.12	-0.13
	(0.43)	(0.41)	(0.26)	(0.23)	(0.31)	(0.30)	(0.22)	(0.24)	(0.07)	(0.08)
Profitability	0.10*	0.09	0.02	0.03	-0.08	-0.09	0.05	0.05	0.01*	0.01
	(0.06)	(0.06)	(0.02)	(0.03)	(0.09)	(0.09)	(0.06)	(0.06)	(0.01)	(0.01)
Multiple Relationships	5.16**	3.11	0.06	-0.54	-0.34	-0.57	2.13*	2.59*	0.13	0.27
	(2.38)	(2.20)	(1.40)	(1.24)	(3.03)	(3.04)	(1.27)	(1.33)	(0.42)	(0.57)
ΔHHI	-1.00***	-1.62***	-0.47**	-1.02***	0.30	0.52	0.00	-0.33	-0.26	-0.27
	(0.35)	(0.55)	(0.20)	(0.35)	(0.36)	(0.61)	(0.32)	(0.42)	(0.23)	(0.23)
ΔHHI * Large Firm	0.72	0.71	0.55**	0.55**	0.16	0.15	0.15	0.12	0.20	0.20
	(0.48)	(0.46)	(0.23)	(0.22)	(0.72)	(0.72)	(0.34)	(0.34)	(0.37)	(0.35)
Termination Propensity		1.56**		0.79*		-0.08		0.56		-0.06
		(0.76)		(0.46)		(0.66)		(0.54)		(0.14)
ΔTermination Propensity		-0.25		-0.25		0.11		-0.16		
		(0.22)		(0.16)		(0.18)		(0.11)		
Adjusted-R^2	0.09	0.11	0.03	0.08	-0.03	-0.06	0.00	0.00	0.00	0.00

*** Significant at 1%. ** Significant at 5%. * Significant at 10%.

Appendix

Acquiring and target bank identity, merger event dates, merger characteristics, the number of firms with relationships to merging banks in the year of the announcement, and changes in measures of market concentration as a result of proposed merger.

Event dates correspond to the earliest day of speculation about the merger or, in the case of undetected speculation, the day a public announcement was made. The table contains only those merger announcements involving banks with connections to firms listed on the Oslo Stock Exchange between 1979 and 1996. Banks for which we have stock price data are indicated in boldface. "SpB" refers to *Sparebanken*, or savings bank. ΔHHI measures the increase in the concentration of OSE firm bank relationships assuming the merger is consummated merger, measured by the change in the Herfindahl-Hirschman Index. For Merger Size, a bank is Large if it is one of the top five banks in Norway, by total Norwegian bank assets. All other banks are Small. LL is a Large-Large merger, or merger between a Large acquirer and Small target, LS is a Large-Small merger, and SS is a Small-Small merger. The number of acquiring and target bank borrowers refers to the number of OSE-listed firms maintaining a relationship with each bank in the year prior to the merger announcement. Firms are listed as target bank borrowers only if they do not simultaneously maintain a relationship with the acquiring bank.

#	Acquiring Bank *(New Bank Name)*	Target Bank	Event Date	Merger Size	ΔHHI	Merger Completed?	Number of Acquiring Bank Borrowers	Number of Target Bank Borrowers
1	**Christiania Bank og Kreditkasse**	Fiskernes Bank	11/11/83	LS	0	Yes	43	0
2	Fellesbanken *(SpB ABC)*	SpB Oslo-Akershus	11/05/84	SS	1	Yes	1	1
3	Chemical Bank	Horizon Bancorporation	05/02/86	SS	0	Yes	5	0
4	Chemical Bank	Texas Commerce Bancshares	12/15/86	SS	3	Yes	5	1
5	**Forretningsbanken** *(Fokus Bank)*	**Vestlandsbanken** and **Bøndernes Bank**	01/22/87	SS	6	Yes	7	1
6	Fokus Bank	**Buskerudbanken**	03/12/87	LS	7	Yes	9	1
7	SpB Nord *(SpB Nord-Norge)*	Tromsø Sparebank	09/28/88	SS	1	Yes	0	1
8	**Bergen Bank**	**Rogalandsbanken**	05/24/89	LS	28	No	34	1
9	**Bergen Bank** *(Den norske Bank)*	**Den norske Creditbank**	10/05/89	LL	887	Yes	34	23
10	Finansbanken	Kjøbmandsbanken	10/24/89	SS	0	No	1	0
11	SpB ABC *(SpB NOR)*	SpB Østlandet	12/18/89	LS	5	Yes	4	1
12	**Christiania Bank og Kreditkasse**	**Sunnmørsbanken**	01/19/90	LS	52	Yes	52	1

13	**Fokus Bank**	**Tromsbanken**	01/25/90	LS	0	Yes	10	0
14	**Christiania Bank og Kreditkasse**	**Sørlandsbanken**	04/05/90	LS	0	Yes	52	0
15	**Fokus Bank**	**Sørlandsbanken**	04/06/90	LS	0	No	10	0
16	**Fokus Bank**	**Rogalandsbanken**	04/21/90	LS	10	Yes	10	1
17	**Oslobanken**	Finansbanken	05/09/90	SS	0	No	0	1
18	**SpB NOR**	Finansbanken	08/23/90	LS	0	Yes	0	1
19	Chemical Bank	Manufacturers Hanover	06/07/91	SS	0	Yes	1	0
20	**Oslobanken**	Den Norske Hypotekforening	09/10/92	SS	0	No	2	0
21	**SpB NOR**	Den Norske Hypotekforening	10/01/92	LS	0	Yes	2	0
22	Christiania Bank og Kreditkasse	Fokus Bank	10/06/92	LL	620	No	40	8
23	**Bergens Skillingsbank**	**Norges Hypotek Institutt**	10/08/92	SS	0	Yes	0	2
24	**Den norske Bank**	**Oslobanken**	04/23/93	LS	72	Yes	57	1
25	**SpB NOR**	Fokus Bank	11/09/93	LL	37	No	3	10
26	Christiania Bank og Kreditkasse	Fokus Bank	11/10/93	LL	486	No	37	9
27	Oslo Handelsbanken	Finansbanken	09/07/94	SS	0	No	0	1
28	**Christiania Bank og Kreditkasse**	**Norgeskreditt**	05/19/95	LS	0	Yes	42	0
29	**SpB NOR**	**Norgeskreditt**	06/14/95	LS	0	No	6	0
30	**SpB Nord-Norge**	**Nordlandsbanken**	06/26/95	SS	0	No	0	1
31	**Fokus Bank**	**Industri & SkipsBanken**	11/21/95	LS	0	No	7	0
32	**Fokus Bank**	**Bolig & Næringsbank**	01/29/96	LS	0	No	7	0
33	**Industri & Skipsbanken**	Finansbanken	03/21/96	SS	0	Yes	0	2
34	**Fokus Bank**	**Bergens Skillingsbank**	04/24/96	LS	0	No	7	0
35	**SpB Nord-Norge** *(Sparebankgruppen)*	**SpB Rogaland**, **SpB Vest**, and SpB Midt-Norge*)*	06/04/96	SS	1	No	2	0
36	**SpB Vest**	**Bergens Skillingsbank**	06/07/96	SS	0	No	1	0

37	Svenska Handelsbanken	S-E-Banken	09/23/96	SS	0	No	2	0
38	**Sparebankgruppen**	**Bolig & Næringsbank**	09/31/96	LS	0	No	2	0
39	S-E-Banken	Unibank	12/23/96	SS	0	No	0	1